



Phosphate disturbance in critically ill children: Incidence, associated risk factors and clinical outcomes



Ahmed Nabih El Shazly^a, Doaa Refaey Soliman^a, Effat Hussien Assar^b,
Eman Gamal Behiry^a, Ibrahim Abd El Naby Gad Ahmed^{b,*}

^a Department of Pediatrics, Faculty of Medicine, Benha University, Benha Qualubia, 13511, Egypt

^b Department of Pediatrics, Faculty of Medicine, Benha University, Toukh Qualubia, 13471, Egypt

HIGHLIGHTS

- Hypophosphatemia was common in the first 7 days of pediatric intensive care unit hospitalization.
- Significant association between hypophosphatemia and duration of use of mechanical ventilation.
- Hypophosphatemia was associated with prolonged pediatric intensive care unit length of stay.
- Hypophosphatemia was associated with use of furosemide, dopamine, steroid and β_2 agonist.
- Good nutrition of critically ill children has an important role in improving their clinical condition.

ARTICLE INFO

Article history:

Received 10 May 2017
Received in revised form
30 July 2017
Accepted 30 July 2017

Keywords:

Hypophosphatemia
Critical illness
Malnutrition
Phosphorus

ABSTRACT

Background: Hypophosphatemia is one of the common disorders that develop in critically ill patients. It has potential complications and is often unrecognized in those patients.

Objective: Determining the incidence of hypophosphatemia in critically ill children, its association with clinical outcomes and the possible risk factors.

Methods: 50 patients were enrolled in the study. Levels of serum phosphate were measured on day 1 and day 7 of PICU (Pediatric intensive care unit) stay. The following variables were analyzed: age, gender, diagnosis on admission, malnutrition, phosphorus intake, clinical severity score on admission OFI (Organ Failure Index) and daily scores PELOD (Pediatric Logistic Organ Dysfunction), sepsis, use of dopamine, furosemide and steroids and assessment of nutrition by z scores.

Results: The incidence of hypophosphatemia on admission was 42%. On seventh day of admission incidence of hypophosphatemia was 62%. Malnutrition was present in 24% of patients, serum phosphorus level was significantly lower in malnourished than in well-nourished children (**p value = 0.018**). Hypophosphatemia was associated with prolonged PICU length of stay (**p < 0.001**) but was not associated with increased mortality (**p = 0.13**). Cases on parenteral nutrition and insufficient oral intake while on mechanical ventilator significantly showed hypophosphatemia (**p = 0.017**). Hypophosphatemia was associated with the use of furosemide, dopamine, steroids and β_2 agonist.

Conclusion: Hypophosphatemia was common in the first 7 days of PICU hospitalization and was associated with prolonged PICU stay, Significant association between hypophosphatemia and duration of use of mechanical ventilation, use of furosemide, dopamine, steroids and β_2 agonist.

© 2017 The Author(s). Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Phosphate is a constituent of various intermediate compounds involved in key physiological processes such as adenosine triphosphate, 2,3-diphosphoglycerate and intracellular chemical messengers (e.g., cyclical adenosine monophosphate, cyclical

* Corresponding author.

E-mail address: dbrahimgad@yahoo.com (I.A.E.N. Gad Ahmed).

guanosine monophosphate) [1,2]. Electrolyte disorders frequently develop in critically ill patients during the course of stay in PICU [3]. Phosphate disturbance is one of those frequently encountered electrolyte disorders. These are at increased risk of morbidity [4]. In general hospital populations, the prevalence of moderate hypophosphatemia ranges between 0.43% and 3.1% [5,6], and 45% of all hospital hypophosphatemia cases occur in the ICU population in this prospective study, hypophosphatemia was common in critically ill children that incidence of hypophosphatemia was 42% at admission. At seventh day incidence of hypophosphatemia was 62% and Potential risk factors in most patients with phosphate disturbance include malnutrition, which was present in 24% cases, sepsis was present in 34% of cases, drugs like catecholamine's 24% of cases, antacids 10% of cases, diuretics 36% of cases, steroid therapy 76% of cases [7].

Symptoms of hypophosphatemia tend to be nonspecific in the majority of cases and include fatigue and irritability. Lower level (less than 1.0 mg/dl) may lead to more hypophosphatemia serious problems such as reduced diaphragmatic contractility, cardiac arrhythmias, myocardial reduction and severe congestive cardiac insufficiency [8].

Phosphate disturbance has been reported to be associated with increased morbidity and mortality in critically ill patients such as respiratory failure, increase the duration of stay on mechanical ventilation, and increased PICU length of stay [9].

To date, the majority of studies have involved adults, but hypophosphatemia is generally underdiagnosed in children, where frequency and predisposing factors are not yet fully understood. Based on the premise that hypophosphatemia is a frequent, often undiagnosed disturbance in children, the aim of this study was to identify the incidence and risk factors for hypophosphatemia in critically ill children.

1.1. Aim of work

The aim of the study was to estimate the incidence of phosphate disturbance in critically ill children, study its clinical effects and risk factors in patients during their stay in PICU.

1.2. Patients and methods

The current cross sectional study was conducted at the Departments of Pediatrics and Clinical Pathology, Faculty of Medicine, Benha University Hospital, during the period from January 2016 to September 2016. After approval of the study protocol by the local research and ethical Committee of Faculty of Medicine, Benha University and after obtaining parents' written fully informed consent; 50 critically ill children were enrolled in the study. The study included all critically ill children from both sexes from 1 month and up to 18 years admitted to PICU in Benha university hospital. The cases included patients attending with pneumonia, central nervous system infection, acute heart failure, status asthmatics, and sepsis. Exclusion criteria: In our study, we excluded patients outside age group, PICU stay less than 7 days, patients refused to be involved in the study.

Blood specimens of serum phosphorus levels on admission and the second sample on seventh after admission were collected [5 ml whole blood collected in Red top tube (clot activator) from subjects], the specimens were centrifuged and the serum or plasma removed from the cells within 2 h of collection. Samples were frozen at -15°C to -20°C . Frozen samples were thawed only once. Analyze deterioration may occur in samples that are repeatedly frozen and thawed. DIALAB and EASYLYTE was used for samples analysis.

1.3. Clinical data collection

The study group was subjected to: Complete history taking including history of chronic illness, primary admission diagnosis and history of medications used especially that having significant effect on phosphate level. General examination and systemic review was done. Presence of infection or sepsis according to center for disease control and prevention [10]. Detecting severity of illness using (OFI) score and (PELOD) score [11].

Nutritional state classification, the weight-for-age (W/A) percentile is used as the anthropometric indicator for children younger than 2 years, whereas body mass index is used for children older than 2 years. By using percentiles developed for Egyptian children.

The target caloric requirements are calculated according to the recommended daily allowance and the route of administration based on age, sex and weight.

1.4. Laboratory analysis

Laboratory investigations including: CBC, CRP, ABG, random blood sugar, serum electrolytes, renal and liver function tests were done. Blood specimens of serum phosphorus levels on admission and the second sample on seventh day after admission.

Statistical analysis: Data were analyzed by (SPSS)

- **Description of quantitative** variables as mean, SD for normally distributed data and median value for abnormally distributed data.
- **Description of qualitative** variables as number & percentage.
- **Student t-test** was used to assess the statistical significance of the difference between two population means in study involving independent samples.
- **Chi-square test** was used to compare qualitative variable between independent groups samples.
- **Mann-Whitney U test** (Z value) for two independent samples of abnormal data distribution.
- **Level of significance**
 - Probability level (P-value) ≥ 0.05 = Non significant (NS).
 - P-value < 0.05 = Significant.
 - P-value < 0.001 = highly significant

Table 1
Demographic and clinical characteristics of study population.

Variable	No. (N = 50)	% (100.0)
Age (m)	Mean \pm SD (Median) Range	14.3 \pm 13.9 (9) 3–84
Sex	Male Female	26 24
Weight (kg)	Mean \pm SD Range	7.5 \pm 3.2 3–20
Length (cm)	Mean \pm SD Range	72.3 \pm 12.4 55–120
BMI (kg/m ²)	Mean \pm SD Range	13.8 \pm 2.4 7.1–19.6
Admission diagnosis		
Respiratory disorder	30	60%
Heart failure	7	14%
Sepsis	15	30%
Malnutrition	9	18%
Mechanical ventilated	18	36%
Acute encephalopathy	8	16%
Septic shock	3	6%
Trauma	1	2%

SD Standard deviation.

Download English Version:

<https://daneshyari.com/en/article/5722866>

Download Persian Version:

<https://daneshyari.com/article/5722866>

[Daneshyari.com](https://daneshyari.com)